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An Interesting Rumour

The American foundry Press has published some early information relative to a new type of moulding sand. Foundrymen returning from the States have added a little here and there, but at the moment no disclosure has been made of either the name of the inventor or the concern which has sponsored the initial trials and large-scale production tests. From the information we have available, it appears that the sand is prepared by mixing suitable silica sand with a specially plasticisable resin of petroleum derivation and processing in such a way that each grain is given a carbonaceous self-bonding coating. Thus the foundry has the chance of being given what at first sight would appear to be the equivalent of a dry sand mould with the necessity of drying. Surely such a water-free sand would reduce, if not eliminate, the necessity for sulphur in sands compounded for the reception of molten magnesium alloys. Again, the defects in heavy non-ferrous castings arising from mould gases, which have been so thoroughly investigated by Dr. Pell-Walpole, and recently published in our columns, may disappear, as it has been stated that when the molten metal reacts with the bond an inert gas is generated.

Naturally, one could speculate to great lengths as to what should happen under these novel conditions, but what has so far been disclosed is that this water-free sand is being used under production conditions. The sand, although possessing the properties of dry sand, in practice resembles green sand work. The sand is not sticky but has the necessary cohesion; its hot strength is said to be satisfactory. Obviously, with repeated usage, some bond must be lost and replaced. As the ash is controlled to less than 0.5 per cent., there will be but little to fear from this contamination. It is clear from what small indirect contact we have made with the inventor, that he regards his process as being nothing other than "sensible." The great query, so far as we can investigate it, is the nature of the inert gas liberated. An older generation of foundrymen ascribed all its ills to sulphur and oxygen. The newer generation is not so sure. It suspects hydrogen and is not too certain of nitrogen, but it is at least more than open minded; it has confidence that, properly directed, each new invention will contribute something towards a better understanding of fundamental problems. Though a first reaction was to regard the proposed sand as providing a sort of dry sand without going to the trouble and cost of drying, second thoughts disclose a difference, for even in a dry sand mould there is still the combined water in the clay content of the bond which is probably released on contact with the higher melting point foundry alloys.

To evaluate the worth of the new process, comparison would best be made with the system wherein the moulds are made by the exclusive use of baked oil sand cores. Here, the difference is at once apparent as in the one case the bond is virtually destroyed, whilst in the second, it is retained. It is possible that by the time the delegation from this country to the forthcoming Jubilee Congress of the A.F.A. reaches Cleveland, more information, or reliable gossip, may be forthcoming.

CO-OPERATION BETWEEN industry and technical education is essential if we are to achieve anything like the progress which our situation demands, Sir Charles Tennyson, secretary of the Dunlop Rubber Company, Limited, told the Association of Technical Institutions on his election as president for the year. Many of the technological achievements of the war, he said, arose from the skills developed by large industrial organisations. Progress was likely to be rapid and continual. Whether training was to be given at the university or the technical college, there should be the closest co-operation with those actually engaged in the direction of technical and research departments of large industrial units to ensure that techniques, plant, and equipment were up to date, and that education and industry were keeping step.

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NOTES FROM THE BRANCHES

EAST ANGLIAN SECTION.—The annual general meeting was held in the Lecture Hall of the Central Library, Ipswich, on March 21. The president, Mr. D. Carrick, occupied the chair. The minutes of the last annual general meeting having been confirmed, Mr. A. N. Sumner, the honorary secretary, presented his annual report:—

The past year in witnessing the end of the war, and of the black-out, allowed for more favourable conditions both in travelling to, and the organising of, meetings. The Council decided in view of this to revert to the pre-war winter session, in place of the war-imposed summer meetings. As this would, if changed abruptly, have caused an unusually long non-meeting period, the meetings had been spaced over a half-summer, half-winter, session.

The first of the seven meetings thus held was, by the courtesy of the management, a visit to the Waterside Works of Ransomes & Rapier, Limited, Ipswich, followed by a number of films obtained and shown by Mr. P. Tibbenham. "A Foundry Inquest, Fault and Cure," "Symposium on Inspection and Testing," "High Duty Cast Irons," "Symposium on Rate Fixing," and a short Paper competition made up the subject matter for the rest of the meetings. Finally, that evening's lecturer was Mr. J. L. Francis, dealing with "Some Casting Troubles." It was interesting to note that, with the exception of the Paper by Mr. Francis, the authors of all the Papers presented were members of the section.

The membership strength of the section had once again improved, as since the last annual general meeting, while two members had been lost through transfer, and two others have died, thirteen new members had joined, making a total increase of nine members and bringing the total for the section to 80 members and 1 member firm. The average attendance during the session had, however, dropped to 27 members per meeting, representing 35 per cent. of the present total membership, compared with 41 per cent. for the previous session.

Students of the Foundry Practice and Science class at the Ipswich School of Technology were, with one exception, now completing the second year of the three-year course. The Technical Education Advisory Committee had met and arrangements were being made for the introduction next term of the final, as well as the present intermediate course, for the City and Guilds certificate.

The following officers were elected for the ensuing session:—

As president, Mr. A. F. Hammond; as vice-presidents, Mr. R. F. Coates and Mr. L. W. Sanders; as honorary secretary, Mr. A. N. Sumner; as members of the Council (3 years), Mr. L. R. Davey and Mr. H. Kirk.

The chairman then introduced Mr. J. L. Francis, who read his Paper on "Some Casting Troubles." This will appear in a future issue of the JOURNAL.

WALES AND MONMOUTH.—On March 30, members visited the works of the Sanders Valve Company, Limited, at Cwmbran, near Newport. Arriving at 3 p.m., they were met by Mr. A. L. Trump, director, and Mr. Rowlands, works manager, and assembled in groups each in care of a guide for a tour of the works. This included foundry, machine shop, pattern shop and rubber department.

The efficient guides readily answered all questions arising *en route*. The company next adjourned to the works canteen where an excellent tea was provided, nearly a hundred members being present.

In a brief speech of welcome, Mr. A. L. Trump said that he hoped the visit had been of interest to those present. It was a good thing for the industry that members engaged therein should see how foundries other than their own surmounted their difficulties and produced sound castings. Mr. Biss proposed a vote of thanks to Mr. Trump and his firm for their kind invitation and generous hospitality. He was pleased to see so many young members sufficiently interested in their craft to devote their Saturday afternoon to seeing how their neighbours did the job. Mr. A. L. Pendrey seconded this, which was carried with acclamation.

Following tea, Mr. Peers, of Derby, presented a Paper on the "Production of Tank Wheels in a Mechanised Blackheart Malleable Ironfoundry," illustrated with a range of slides. Unfortunately, time did not permit of discussion owing to the lecturer having to catch his return train. The meeting then closed with a vote of thanks to Mr. Peers for his attendance.

DETERMINATION OF COPPER IN STEEL

A rapid method for determination of copper in steel especially suitable for foundry control is described by FREDERICK B. CLARDY, JOHN C. EDWARDS, and JOHN L. LEAVITT in "Industrial and Engineering Chemistry" for December, 1945. The total time for the analysis is approximately 15 min. Its accuracy makes it suitable as a standard method for copper in steel up to 1.3 per cent. with a maximum error of less than $\pm$ 0.02. The method involves precipitation of copper as cuprous thiocyanate from a perchloric acid solution and subsequent titration of the cuprous thiocyanate by the Andrews method, using chloroform and potassium iodate.

CHARACTERISTICS OF BLAST-FURNACE GAS

Comprehensive data on the composition and quantity of blast-furnace gas under various conditions are given in a Paper by OWEN R. RICE (Freyn Engineering Company, Chicago), presented at a meeting of the Association of Iron and Steel Engineers, and published in "Iron and Steel Engineer," February, 1946. The author brings out several refinements in blast-furnace gas analysis which, although often not taken into account, have a material effect upon the accuracy of calculations.

THE DANGER TO British industrial progress through the call-up of young scientists has been urged upon the Minister of Labour by the National Union of Manufacturers.

TECHNICAL RECORDS IN THE FOUNDRY*

By R. D. LAWRIE

Foundries' Superintendent, Stanton Ironworks Company, Limited

Summary

This paper describes the application of modern controlled methods to the production of a variety of grey iron castings. The Author endeavours to show how, by keeping careful records of every phase in the production of certain castings, it is possible to maintain a high standard of quality; keep an accurate record of costs; a permanent record of all manufacturing data for reference in the event of repeat orders, in case of failures or with the object of effecting economies or improvements in the future; also data for compilation of future estimates. Examples are included of technical records for certain castings, manufactured for a variety of uses mainly connected with the recent war effort.

Introduction

The subject of "quality in the foundry" is one which has received considerable prominence in the foundry Press within the past year or two. Several writers have expressed their views in different ways, and it would appear that they are all generally agreed, that to obtain quality is no easy achievement, and that a high degree of technical skill must be exercised in the control of the many and varied operations. The Editor of the FOUNDRY TRADE JOURNAL summed up the question very neatly and concisely in the issue dated December 23, 1943, in the introduction of a Paper by William G Reichert, entitled "Quality of Castings Begins in the Foundry," when he stated that: "Every factor in foundry practice determines the final quality of castings and merits the closest consideration and control." To examine every factor in foundry practice is a most exhausting and elusive task, and judging by the variety and frequency of the Papers presented to the numerous branches of the Institute of British Foundrymen, is likely to remain so for many years to come. It will, therefore, be conceded that it is beyond the scope of the present Paper to attempt more than to touch briefly on one or two factors which have a direct bearing on the matter of quality. Most authors of Papers on this subject stress the desirability, in fact necessity, for keeping technical records.

Reichert states: "Records are of major importance in order to present the facts in any foundry, and a permanent record of all test data should be kept for reference, so that casting losses may be constantly checked, even after they have been despatched to the machine shop. A complete, clear and concise set of records of each day's operations correctly compiled and properly interpreted should be required."

Factors to be Recorded

At this stage it is desirable to stop to consider what factors should be recorded in the average foundry, and by whom. In order to appreciate or understand technical control in its fullest sense, an executive must follow the various raw materials right through the many stages or processes until they finally emerge as the finished casting: clean, accurate to dimensions, and to the required specification. All raw materials, such as pig-iron, steel, cast-iron scrap, coke, limestone, sands, blackings, etc., are invariably bought to some specification, and it is the duty of the foundry metallurgist to see that they comply within reasonable limits with the appropriate specification. The chemical laboratory is responsible for the testing of all incoming raw materials, the results of which are usually recorded graphically, so that any deviation from specification is observed at once, and corrective measures taken if necessary.

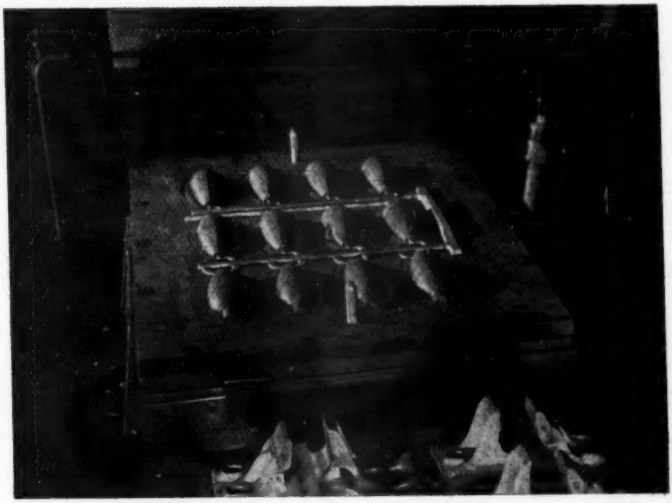

FIG. 1.—PATTERNS FOR 4.2-IN. T.M. BOMBS (RAMMING POSITION).

*A Paper read before the Scottish and Lancashire branches of the Institute of British Foundrymen.

Technical Records in the Foundry

The metallurgist computes the various metal mixtures, draws up the sequence and quantities of each mix in collaboration with the cupola foreman; the latter supervises the charging and melting, and generally ensures that the correct metal goes to the proper quarter in accordance with the pre-arranged plan. At the end of each day's melt a record should be completed and carefully filed.

Before leaving the cupola, each ladle of metal should be subjected to some form of rapid test (usually a chill test) in order to find out if the elements of composition are properly balanced, as reflected by the depth of chill, and to enable correctives to be administered if necessary. Each chill piece also serves as a sample from which to record the contents, the pieces to be clearly marked for future identification.

The next matter to consider is sand preparation, and it is imperative at this stage that the correct sand mixtures be determined; these will depend upon the size and shape of the casting, service requirements, and type of metal to be cast into the mould. Moulding and core sands are generally prepared in some mechanical unit, so that uniformity and thorough mixing is easily possible; tests for moisture, green and dry strengths, and permeabilities are taken at intervals, the results of which are capable of being recorded graphically.

Having considered the preliminary operations, moulding commences and graphs fade into the background for the time being; records take on a different form, and become a tabulated list, or "documentary" of the essential facts pertaining to the job on hand. Depending upon the nature of the work produced, these records may be very simple, or they may be very elaborate; in the latter case they may extend to several pages. For instance the detailed description of a bend for exhaust steam and a hydraulic cylinder took two hours to describe, and occupied fifteen pages in the *Proceedings* of the Institute for the year 1939-40. This is one form of technical record; on the other hand, a photograph of the casting as poured, indicating the main dimensions, with gates, risers, feeding heads, chills, etc., clearly marked, may suffice.

FIG. 3.—LOCO WHEEL CENTRE MOULD (BOTTOM PART).

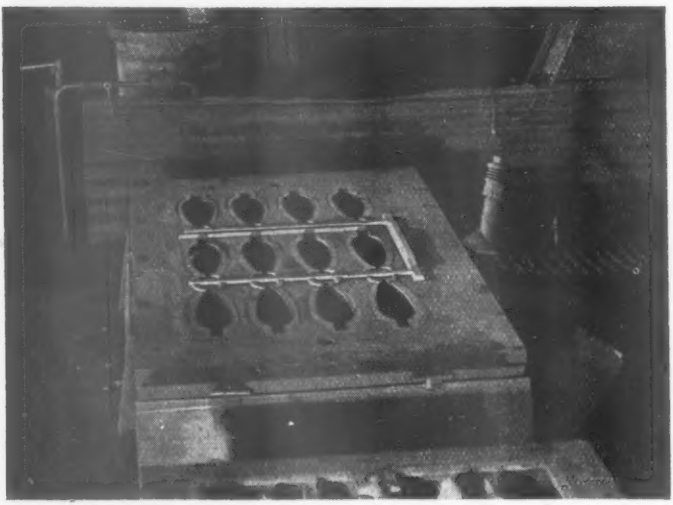

FIG. 2.—PATTERNS FOR 4.2-IN. BOMBS (PATTERNS STRIPPED).

Within recent years the Author and his colleagues at the Stanton Ironworks have considered various methods and forms of recording technical data on certain important castings, the outcome of which the Author is able to offer for consideration the following *proforma*, which takes care of almost every factor worthy of putting on record. It may be felt that they have gone to the extreme, but it should be appreciated that the *proforma* as designed is a comprehensive one, and takes care of all data for practically any size or type of casting, produced in any metal, by hand, or mechanical methods, for jobbing or mass-

produced quantities; in green sand, dry sand or loam.

Technical records can usefully include sketches and photographs, showing certain details such as the size and position of gates, risers, feeding heads, etc. Sketches are also invaluable in illustrating certain features in manufacturing methods which cannot be clearly expressed in the text.

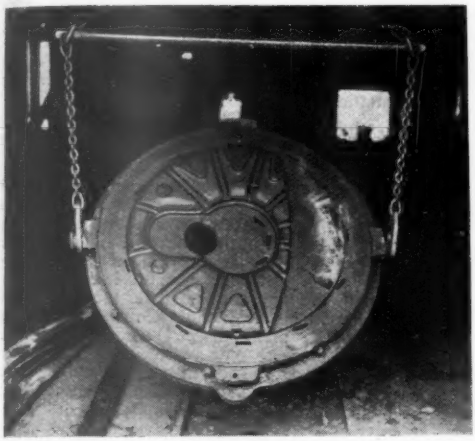

FIG. 4.—LOCO WHEEL CENTRE MOULD (TOP PART).

Having produced the casting record, the list is by no means exhausted as one can now proceed to graph such factors as:—

(1) Shop outputs (daily, weekly or monthly); (2) outputs per man-hour; (3) shop waste; (4) test-bar results (transverse, tensile, and Brinell, etc.); (5) shop costs; (6) job costs; (7) direct and indirect wages; (8) piecework prices; and (9) estimates.

Shop waste recorded graphically affords a quick and ready method of putting the finger on trouble as it arises, as arise it does, with greater frequency than one cares to remember, let alone record. For this purpose the waste report, which might well be the reverse side of the weekly output report, should have the wasters recorded under the following headings: (*a*) Sand faults; (*b*) moulding faults; (*c*) core faults; (*d*) metal faults; and (*e*) miscellaneous.

By comparison with the daily sand tests, and metal analysis, a lead is at once obtained which usually indicates where the practice has deviated from standard; in fact, it is possible to foresee and forestall waste by intelligent interpretation of graphs. If, for example, it is observed that the permeability of a sand is steadily falling, and corrective measures are not taken, an epidemic of blowholes or scabs may occur; similarly if the dry strength is low, dirty castings may be expected, due to sand washing away at runners and corners. If carbon and silicon show signs of dropping, hard and drawn castings will soon occur; on the other hand, if both these elements rise above normal, the machinist will report beautiful soft castings, easy to machine, but they will not stand tests for strength, or soundness under water or air pressure.

Numerous other examples may be given, and any foundryman so minded can add to the already sizeable list which the Author has put before you in this Paper.

Conclusions

Having given a brief outline of some of the records kept by the Stanton Ironworks Company, let us examine the value or uses to which these records can be put.

(1) Records enable the foundryman to put his finger on the cause of leakages, losses, failures, and inefficiency.

(2) Records present the complete facts of any case, take the guesswork out of management, and help to plan the work of the future.

(3) If a job has to be repeated after a lapse of time, or even transferred to another foundry, records give

FIG. 5.—A 15-TON CAUSTIC POT—NICKEL CAST IRON.

Technical Records in the Foundry

reliable information upon which to base plans, and so reduce the hazard of loss.

(4) Records of past performances give an accurate check upon the individual capacities of workmen, assist in adjusting wage problems, also establish a check on which to judge the efficiency of present performance.

(5) In cases of illness or changes of staff, records are invaluable in keeping a smooth flow of production during the period of transition of supervision.

In short, essential records are the key by which a manager or foreman can check the performance of his

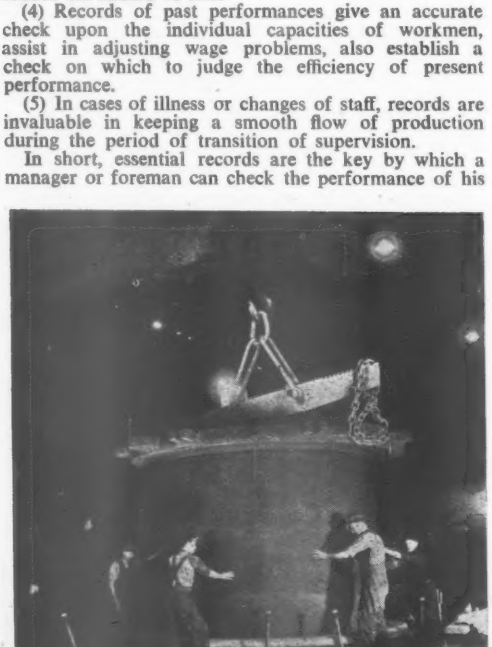

FIG. 6.—CAUSTIC POT LOWERING IN MAIN CORE.

department, and serve to direct attention to those factors upon which attention should be concentrated.

The foreman or manager may ask: who is to be responsible for compiling these records? As far as records in the foundry are concerned, the Author and his colleagues have given this aspect serious consideration, and reference to the *pro-forma* will show that the task can be divided amongst the executives who control the various stages of the job; the metallurgist, the patternmaker, moulder, cupola, fettler, machine shop and despatch foremen, all contribute their quota of information. The final correlation and compiling of the whole record is easily within the capabilities of a fourth- or fifth-year apprentice, who has displayed average ability. What finer opportunity could a young man have, to acquire a full and comprehensive knowledge of every phase of the activities of the foundry in which he is employed. In the seeking out and recording of the facts, he probes at the fundamental roots of the foundry craft, and gets a unique opportunity to see for himself at first hand, all that he has learned by perusal of technical literature, study at technical classes, and attendance at meetings of the I.B.F.

In conclusion, the Author would like to express his thanks to Mr. P. H. Wilson, O.B.E., Deputy Managing Director, Stanton Ironworks Company, for his permission to present this Paper, and to all his colleagues at Stanton, who have helped in many ways in making this presentation possible.

COOK'S WAR EFFORT

Most foundrymen have at some time or other used the services of Thomas Cook & Son, for their business and pleasure trips, but few have thought of them as foundry owners, yet during the war, Egypt was the scene of some of this company's most valuable contributions to victory. Cook's fleet of luxurious river steamers plied the Nile on war-like missions. At Boulac, on the Nile, the famous Cook's Engineering Works executed many large service contracts. Equipped to build every type of steel and wood river craft, from tugs to barges, cabin cruisers and pleasure steamers, the Boulac Works has the biggest floating dock on the Nile. Numerous motor torpedo destroyers and other craft were built for the Admiralty. The engineering shops, which include a foundry capable of castings up to five tons, can cope with all the various processes connected with general engineering and boiler making: metal tubing, drilling, welding, etc. Here much special equipment was designed and made for the war, such as special tackle for the recovery of damaged tanks from the desert, mountings for Bren guns, and others too numerous to mention.

In the Motor Transport Repair Department some 800 men laboured on the overhaul, repair, assembling and reconditioning of hundreds of internal combustion engines, cars, lorries, cycles, portable generating sets, etc., for the fighting forces. Repairs to damaged armoured cars of all types were carried out. Many car and truck bodies were constructed and adapted for portable kitchens, wireless cars, mobile photographic dark rooms, ambulances, and so on. Concurrently with all this war work the normal activities of peace time were undertaken, such as the installation and erection of pumping plants for supplying fresh water to villages from borings; generating plants; electric cables; water towers; pipe lines; electrical passenger lifts, and cars constructed in wood or metal.

TWO FIRMS OF pig-iron, steel and coke merchants, Dickins Bros., Limited, and F. F. Sharpe, have amalgamated as Dickins Bros. & F. F. Sharpe. The address of the new concern is Shut End, Pensnett, Brierley Hill. Mr. K. C. Sharpe is to be managing director. The agencies of Dickins Bros., Limited, and F. F. Sharpe will be taken over by the new firm.

LIGHT METAL FOUNDERS' ASSOCIATION

The Light Metal Founders' Association was originally founded late in 1939, immediately after the outbreak of the late war. At that time it was essential to organise the industry in such a way that the Supply Ministries could readily obtain the assistance and considered opinion of the light alloy casting industry on all pertinent matters. As a result of this the Association, which operated extremely efficiently during the war, was in no sense a normal trade organisation and, consequently, it has been necessary to re-constitute it to fit it for peacetime operation.

In the war years, the main requirements were to co-ordinate the technical and commercial aspects of the foundries so that the industry could speak with one voice on these matters, and for this purpose two strong committees were formed, one technical and the other commercial. Both these committees are being retained, as it is felt that the type of advice previously required by Government departments should, in future, be equally useful to the buying public.

The members of the Association will also require the advice of these committees to a greater extent when changing over from war to peace, when it is essential to revise and maintain fundamental principles within the industry.

Satisfying the Buyer

The Association in the past has given considerable attention to ensure that the quality of its castings satisfied the stringent requirements of Government specifications, which call for a higher quality of material than that necessary for normal commercial requirements. It is felt that a similar control of quality which was necessary for wartime specifications shall be continued so as to ensure a similar consistency of quality in commercial castings. The latter will, therefore, be quoted to a British Standard or similar specification where such is required, and if the case is one where specified material is not necessary or economic, this fact will be clearly shown on quotations which will state—"Alloy not specified." By this means the buying public will know exactly the quality of castings, and will be able to compare like with like when reviewing quotations.

Costing and Quoting Policy

The Association has definitely set its face against any form of price regulation, but has instituted a Costing committee which will advise all members on a recommended principle of foundry costing, and thus cut out any need for approximating a selling price by such methods as "price per lb.," or similar inaccurate methods in arriving at a selling price. It is felt that by clearly defining the quality of the material used and by ensuring that all foundries are quoting figures based on an agreed method of cost observation, the Association will minimise the chances of uneconomic prices which are as dangerous to the buyer as they are to the seller.

Secondary Alloys

Very considerable strides have been made in foundry technique during the war, and since the war there has been a reduction in the price of virgin aluminium. As regards the so-called secondary alloys or commercial grades of aluminium, the Association of Light Alloy Refiners (A.L.A.R.) has arranged to control and maintain all its refined material to agreed specifications. This means that, in future, aluminium castings can be looked upon as utility articles instead of being considered as a semi-luxury which can only be paid for when reduction in weight or the rust-proof qualities of aluminium justified the extra expense.

To deal with this important aspect of post-war trade, the Association has formed a Development committee, and is proposing to work in close co-operation with the Aluminium Development Association (A.D.A.); in fact, it is anticipated that members of the L.M.F.A. will be invited to join all the committees which are responsible for the management of A.D.A.

It is realised by the L.M.F.A. that the finished products of its members are really raw material to the manufacturers of the finished goods. In consequence of this fact, no recommendations for the new applications of castings to old products or for new products based on the use of aluminium can be brought to fruition without the very active co-operation of the finishing manufacturers. These latter will receive the advice of the Development committee in helping them with their decisions to use aluminium and afterwards in designing or modifying their product so as to reap the advantages offered by the change of material.

Publicising Activities

The L.M.F.A. has also arranged for a modest amount of publicity, both internally amongst members so that they are kept fully advised of all activities both inside the Association and amongst the trade in general, and also as regards external publicity. It is hoped to secure the co-operation of the technical Press, so that, when they consider it appropriate, they can hand on to the public any items which they consider will be of general interest. Dealing with the internal structure of the Association, the voting power of its individual members has been graded so that the small firm will have higher voting power in proportion to its size than the larger firm, and the committee has been split into three approximately equal sections, one each for the large, medium and smaller firms, so that in all its deliberations the views of a complete cross-section of the industry should be available.

In revising the constitution of the Association, all possible steps have been taken to safeguard the interests of the buying public by ensuring that the members' output will consistently conform to the quality required by the purchaser, and will be offered at economic prices. Inside the Association, members will have every opportunity for ventilating their opinions and ensuring that those opinions are implemented by a suitable voting power, having regard to their stake in the business. It is hoped that the re-organisation of the Association on the above lines will ensure to the trade its appropriate status in the aluminium industry and in the general commerce of the country.

FORTHCOMING EVENTS

(Secretaries are invited to send in notices of meetings, etc., for inclusion in this column.)

APRIL 12.

Institution of Chemical Engineers:—Annual corporate meeting. At the Connaught Rooms, Great Queen Street, London, W.C.2, at 11 a.m.

Institute of Welding (E. Scotland branch):—Annual general meeting; "Technical Efficiency in the Welding Shop from Design to Inspection of Finished Product," by F. Koenigsberger. At the Heriot Watt College, Chambers Street, Edinburgh, at 7.30 p.m.

Keighley Association of Engineers:—"The Development of British Jet Propulsion," by G. B. R. Feilden. At Devonshire Buildings, Devonshire Street, Keighley, at 7.30 p.m.

APRIL 24.

Institute of Welding:—"The Evolution of Welded Armoured Fighting Vehicles," by Major R. J. Fowler and Major L. F. Denaro. At the Institution of Civil Engineers, Great George Street, Westminster, S.W.1, at 6 p.m.

Institute of British Foundrymen

APRIL 13.

Lancashire branch:—Annual general meeting. At the Engineers' Club, Albert Square, Manchester, at 3 p.m.

APRIL 15.

Sheffield branch:—Annual general meeting. Short Paper competition. At the Royal Victoria Hotel, Sheffield, at 7 p.m.

APRIL 24.

London branch:—Annual general meeting. Short Paper competition. At the Charing Cross Hotel, at 7.30 p.m.

APRIL 27.

Newcastle branch:—Annual meeting. At the Neville Hall, Westgate Road, Newcastle-upon-Tyne, at 6 p.m.

West Riding of Yorkshire branch:—Annual general meeting. At the Technical College, Bradford, at 6.30 p.m.

AGRICULTURAL ENGINEERING OPPORTUNITIES

That research into agricultural machinery and methods of cultivation would open up a vast new field for engineering products is the conclusion reached by the Engineering Industries Association in a report on "Engineering and Agriculture." The report states that the conduct of research and educational activities is a matter for the agricultural, rather than for the engineering, industry; but until intensive activity in these two directions is initiated, the unquestioned potentialities of a revivified agriculture will not be achieved, and a very extensive new field for engineering enterprise will remain closed.

PORE-SIZE OF POROUS MATERIALS

A method for determining the macropore-size distribution in a porous solid, as well as the derived distributions for some typical porous materials, is presented in an article entitled "Pore-size Distribution in Porous Materials," by H. L. RITTER and L. C. DRAKE, published in "Industrial and Engineering Chemistry," December, 1945. A glass dilatometer placed in a thermostated high-pressure bomb is used to measure the small changes in volume of a mass of mercury, in which the porous material under investigation is immersed, when the mercury is subjected to varying external pressure.

A LESSON FROM AIR-RAID DAMAGE

In an interesting Paper just published in the Proceedings of the Institution of Mechanical Engineers, 1945—War Emergency Issue No. 4—Mr. Gilbert Varley has dealt with the subject of the Reconditioning of War Damaged Machine Tools. One phrase of interest to our readers reads—"A marked similarity in the position and extent of the cracking was found in similar, emphasising the known fact that considerable casting stress existed in complicated main body castings of machine tools. This showed the desirability of a stress relieving process after rough machining; the author was meeting this situation in his production of new machine tools by annealing lathe beds at 450 deg. C. for 3 hrs.; the resultant Brinell hardness numbers on lathe beds averaged 187, after treatment."

ALAR, LIMITED, have opened an advice bureau at 36, New Broad Street, London, E.C.2. The development officer in charge is Mr. F. H. Smith.

BERYLLIUM COPPER MASTIC ALLOY containing 4 per cent. Beryllium, balance copper, has been reduced to $14.75 per lb. of contained Be on the American market.

CUPOLA PRACTICE

(*Continued from page* 399.)

ferred the latter alternative but wherever possible would rather increase proportionately the split coke to keep the bed up.

MR. KILLINGWORTH presumed that the CO content of exhaust gases varied in the examples quoted, and the Author replied that this was shown by the type of flame. In the case of the small cokes the flame was continuously burning over the whole charge, whereas normal coke sizes gave a blue flame at the edges of the charge.

MR. PALETHORPE had noticed that melting losses seemed lower and analyses more constant in the smallest cupolas than in larger furnaces. Had Mr. Payne any explanation?

Size Differences

The Author's experience did not confirm Mr. Palethorpe's remarks. He had found difficulties in procuring small uniform charging materials. The silicon and manganese losses were probably lower due to the shorter drop from charging sill and through the melting zone giving less time for chemical reactions to occur.

Vote of Thanks

MR. SWAIN proposed a vote of thanks to Mr. Payne for a most informative Paper and wished to offer, on behalf of the meeting, congratulations to the Author on the award of a diploma for his Paper. Mr. Hornby seconded the vote of thanks and said that Mr. Payne had shown cupola practice to be more than piecemeal charging and he felt that if foundrymen could put the Paper's principles into practice then much improvement of cupola metal would result.

OPPORTUNITIES FOR THE FOUNDRY TECHNICIAN IN INDIA*

Recent Developments in Indian Metallurgical Industries, and Future Prospects for United Kingdom Technicians

By J. BLAKISTON, A.M.I.Mech.E.

INTRODUCTION

One is particularly impressed in this country by the fact that people, after paying a short visit to India, are more likely to record their impressions than people who have been there many years and should, therefore, be in a much better position to speak authoritatively on that still rather unknown and incorrectly understood country. The reason for this is that a newcomer is impressed by such startling contrasts and combinations of centuries-old customs, operating in close proximity, and in many cases in combination with ultra-modernness, in some cases further advanced than in this country. This is apt to strike the visitor so forcibly that he, without hesitation, and sometimes rashly, immediately proceeds to record his impressions. This is also coupled with the fact that the Eastern climate, in many cases, is found to have a temporary stimulating effect, mentally, on the European; he finds that his mind becomes much more active for some unknown reason.

After a visitor has been in the country for some years, he becomes, to some extent, absorbed by the country and takes what originally appeared to him as stark contrasts, as a matter of everyday fact. This gradually grows on him and, in many cases, no matter how he looks forward to his holiday back in the old country, after a few weeks, he longs to return to the East. This Paper, although presented in England, refers to opportunities for the foundry technician whether he is European born or of direct Indian descent; ability and competence to produce results being the prime consideration.

The Author was primarily trained in the heavy iron and steel industries, his initial training leaning towards the mechanical side, but during the last 10 years he has been associated with the precision branch of engineering; the combination of these branches producing a reasonably balanced outlook to the engineering and foundry industry in general, and when the opportunity occurred for him to pay a visit to various Indian foundries, and associated industries, and see them as they were actually operating, in both urban and rural districts, he went with an entirely open mind, and with no pre-conceived ideas. After leaving a country that had been five years at war, he was struck with the freshness and vitality of outlook amongst the senior Indian and European officials in that country.

The Background

A brief description of the country is indicated here so that the reader may have a better grasp of the conditions, both natural and otherwise, referred to later in the Paper. The size of the country is approximately 3,000 miles from north to south and the same distance from east to west in the north—a five or six nights' journey in fast pre-war trains or a full day's flight by air liner. The population is over 400,000,000—a population that has to be seen to bring home what 400,000,000 really means. This population is increasing at the enormous rate of 10 per cent. every 10 years, and the numbers should be compared with the 44,000,000 of the United Kingdom, or 140,000,000 of the United States. This population increase is becoming a serious social problem and is partially occasioned by improvements in health, by better medical services, improvements in the fertility of the land by irrigation schemes, and the minimisation of local famines by means of transport development and distribution organisation.

It is sometimes difficult to reconcile that every social advancement that takes place as described above very often results in a rise of population which undoes the improvement achieved, reducing people to the former status of living. This fact being typical of the many everyday problems which are arising as India gradually awakens. Naturally, with such an enormous population, there is bound to be a larger proportion of outstanding individuals when compared with a country of a smaller population. In the same way that this is counterbalanced by a similar greater number of people less developed.

Ancient Civilisation

The country has been inhabited and has been in a high state of civilisation for thousands of years, traces of high forms of civilisation and government being traced back several thousands of years before the Christian epoch. As a result of this, a stamp has been left on the Indian people which is characteristic of some of the older nations. There is a feeling that the European, and with the European is included America, nations, are comparative newcomers, and in spite of their scientific attainments, are very little removed from barbarians who dressed themselves in skins and dyed their bodies various colours, as recently as 2,000 years ago.

Another characteristic of some of these older nations is one which reveals itself in a form of pessimism. During the period of all these centuries, various political systems have been tried out, some successful and some otherwise, which have ultimately failed through either external invasion, to which India has been particularly subjected, or internal disruption, to which India is again susceptible, probably as a result of the many customs established by the former conquerors which

*A Paper read before the London branch of the Institute of British Foundrymen, Mr. A. J. Murphy, M.Sc., presiding.

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clash. As the result of the above, one sometimes gets the reply from the Indian that—"We have tried out sanitary and political systems equal to the best that the West can produce, thousands of years ago, and it has got us nowhere."

Mineral Potentialities

The country is extremely fortunate as regards mineral deposits, and is possibly one of the richest in the world in this respect. Tremendous deposits of rich iron ore are readily available; deposits of the ancillary materials, like manganese, limestone, etc., accompany this rich ore. Practically every raw material associated with the present developments of industrialisation are readily attainable. As a concrete example of foundry interest, owing to transport difficulties, the Author investigated any potential new sources of moulding sand, and within a few days the following deposits were revealed within a radius of ten miles. The figures given are for the sand in its natural unmilled state.

	Permeability.	*Strength.*
Red sand	55	16.3 lbs.
Crushed sandstone	23	9.6 ,,
Yellow sand	83	4.2 ,,

On making enquiries as to the possibilities of obtaining bentonite a natural deposit was located within 100 miles.

In the past there has been some external opposition to Indian industrial development, India being regarded more as a market than as a producing and competing country, but during the war of 1914-18, considerable advancement took place showing the internal potentialities of the country; this start, which was developing rapidly, has been vastly augmented by the last war. The cry in the past by obstructionists has been, "What is the use of all these rich deposits of minerals if sufficient coal is not available for their exploitation?" Admittedly, the deposits of metallurgical coking coal are not large, and although ample to meet present needs, it is estimated that there is only 100 years' supply available.

This argument, which is generally brought forward to suit interests outside those of India, can be countered by pointing out that the worth-while iron deposits in the United Kingdom are very limited, and apart from a few exceptions the percentage of iron is only 30, while the richest deposits in America available, namely, those of the Mesabi range, have a very limited life. Improved mining methods and extended prospecting are much more likely to enhance the life of the Indian coalfields, while at the present rate of scientific progress, it is quite possible that within the next 100 years hydro-electric development, and new methods of production, may entirely supersede the present-day conception of iron and steel production. When this materialises, the enormous water power for hydro-electric development available, coupled with the rich, practically inexhaustible, iron deposits, should make India into the principal iron producing centre of the world, and it was Thomas Carlyle who said, "The nation which gains the control of iron soon acquires the control of gold." Apart from the vast natural wealth of the country, untold capital wealth is available in India; and the Indian, in view of the present trends in the Western countries, sees no opportunity or security for his investments; therefore, what is more natural than that he should turn to his own country and exploit his own resources for his own and his people's benefit?

The Wootz Process

India was the original iron-producing country of the world, and it is most likely that the art of iron-making gradually travelled westward from this country. The iron pillar of Delhi, although constructed 1,500 years ago, would still present a major problem for a large forge, and its resistance to corrosion has never really been satisfactorily explained, although many theories have been propounded, some of which may be partially correct.

Within a few miles of some of the most modern iron and steel works in the world, it is still possible to see iron being made in the primitive method as was applied when it was manufactured for sale to the ancient Egyptians. This iron is manufactured by mixing the rich ore with charcoal in a small fireclay furnace; the blast is supplied from a goat skin *via* a hollow bamboo pole. There is no flap valve on these crude bellows, they are kept in the raised position by means of a counter-weight and a boy or girl stands on them to force the air out, at the same time covering the suction hole with his or her heel. The resultant mass of iron and slag, after several hours' campaign, represents approximately 50 lbs. This is hammered and re-worked until, in many cases, a fine steel is produced.

The Author was particularly interested to notice, when walking round the market-place of a hill village near Nepal, bars of iron and steel often in the form of an old rail or old iron bolt, all broken to reveal a new fracture. The iron being selected from this fracture by the hill men who eventually turn it into the well-known Ghurka knife. The final test as to the ultimate quality of the steel being the ability of cutting a silver rupee in two with one stroke without showing any nicking or damage to the finely tempered cutting edge.

Industrial Developments

The industrial developments which have taken place up to the present, cover an extremely wide range—large cotton mills on the West coast, jute mills on the East coast; yet in spite of these large mills, and Lancashire's contribution, the majority of the cloth used by the Indian is still home-spun and hand-woven in communal settlements. A serious cloth famine, on account of the dislocation caused by the war, is at present causing much inconvenience. The demand for cloth of good quality, and the machinery and plant to produce it, will take decades to satisfy, and as the standard of living generally improves, this demand will extend.

The principal communal benefits of modern civilisation that are apparent to the observer are the use of mineral oil and their requisite lamps for lighting,

which has superseded oils of animal fat and vegetables; the general adoption of the use of the sewing machine which is apparent in front of the premises of the tailor of the particular settlement (each village in India being practically a self-contained self-supporting community, with every trade being represented, similar to that of a village in England as late as the early 19th century); and the general adoption of bicycles, which will be further accentuated as modern roads are laid down, the roads of India not having developed so much as the railways.

Iron and Steel Works

The iron and steel developments which are the particular concern of this Paper, apart from the historical methods of production, were originally established about the year 1875, but engineering works and foundries had been established as early as 1781, when a Colonel Swinton, a retired Officer of the Honourable East Indian Companies' Army, established an ironfoundry, and other works, at Howrah, on the west side of the River Hooghli. This firm is still in existence and operates under the name of Burn & Company, and covers an area of approximately 30 acres. The original concerns formed in India for the manufacture of iron and steel met much opposition from vested interests in Britain, and every obstacle was placed against their development, both financially and otherwise. It was not until 1914-18, when the stress of war made some of these developments imperative, that real progress was made; but what progress it was, resulting in the erection of blast furnaces, the outputs of which were higher than any other in the world. This led to the development of bulk steel production, and at the present moment, in the case of the two companies alone, two of the finest steel plants in the world are in regular operation, incorporating blast furnaces producing up to 1,100 tons of iron per day, open-hearth furnaces working in conjunction with duplexing, convertor plants together with rolling mills producing steel sections, sheets, etc., to the highest specification. These developments have taken place on the eastern side of India where all the raw materials and one of the most populous areas are in close proximity. On the western side, developments are taking place utilising hydro-electric power to produce high-quality alloy steels. It is visualised that in the next 10 years the output of finished steel may be raised to 5,000,000 tons per annum, or equal to half the 1938 U.K. production.

The Foundry Industry

Foundries were established in the Kulti district in 1889, and occupied an area of approximately 12,300 sq. ft.; the area of these works now cover an area of 2,302 acres. The principal production of these foundries comprised of pipes, and a combined cast-iron sleeper chair in general vogue on the Indian railways. These foundries have made colossal output tonnages, as high as 2,500 tons per week being achieved. Many of these foundries were inaugurated by practical men of the old foundry school, and their stamp still remains in the form of much of the tackle and moulding methods, and the results achieved, without scientific and metallurgical guidance, as is taken for granted these days, reflects every credit on the old school.

Craftsmanship

The finish obtained on the castings and the intricate castings attempted, will stand comparison with any foundry production in the United Kingdom. The Indian artisan, with his inherited artistic ability and generation of experience in the hand-working of metals, is particularly adaptable to the science of moulding, and, provided he is given the correct initial instruction, coupled with a practical demonstration, his ability to produce good work is second to none. His physique, which in many cases is somewhat on the light side, does not preclude him from attaining outputs equal to many of those obtained in westernised countries, under similar methods; a test was made by the Author as follows:—

A bank was prepared in the foundry together with the necessary tackle for plate moulding standard boxes 16 in. by 14 in. by 6 in. deep, top and bottom, with double lug loose pin holes, together with double sides pattern plate made from mild steel to which were affixed wooden patterns. All the necessary tools, namely, strickles, sieves, were placed on hand and the initial bank of sand placed the full length of the working space. It was found that one man during the hottest period of the year could put down, close, and knock-out 40 complete boxes per day, and maintain this output, which compares favourably with most U.K. foundry outputs.

It was also found that on other work, provided all the tackle and materials were immediately at hand, and the operations were of a routine nature, high outputs could be obtained. In the case of intricate large work, the output *per capita* was somewhat lower, but an extremely high finish and high quality casting resulted, the only tendency being that the incorrect placing of cores was likely to occur and that casting hazards, due to incorrect weighing, wedging, etc., were more likely to occur, which could be traced back to insufficient or no directive supervision. It was apparent that the senior executives could not be expected, on account of the vast sizes of the various undertakings, personally to supervise these operations, while the foremen were generally fully occupied with routine direction. There appears to be an opening for a specialised artisan with a technical training fitting him to supervise these operations. The pattern-making was found to be of quite a high standard and the interpretation of the drawings was first class, repeated cases being noted where an individual, who could neither read nor write, could scan a complicated drawing and within a few minutes, in a most uncanny manner, point out draughtsman's errors. The pattern-makers usually work sitting on their benches, holding the work-piece with their toes, and are generally a first-class type of artisan.

Cheap Labour Fallacy

The question is immediately raised as to why, with such good labour available at low wages, is it not possible, in view of the natural resources of the country, for India to come to the forefront as an

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industrial nation; and probably the answer to this can be made by trying to expose the fallacy of cheap labour, a term so glibly employed when talking about the East. Labour is *not* cheap, and it has been found that for equal production on similar plants, when comparisons are taken between western and eastern countries, the labour costs in the East are higher.

In many cases much of the labour is redundant and unnecessary, giving very little return for its employment. For example, if it takes only two men to drive a locomotive in the West, why should it take six men to drive the same engine in the East, and when this is pointed out, the answer is, "We have always had six men on an engine here." The same anomaly occurs in many of the moulding practices; while the actual moulder is placing down as much work as his counterpart does in England, he appears to be surrounded by a swarm of people carrying material by the most primitive method here and there for very little apparent reason, and merely because they have always done so.

Wage increases are occurring in India as in all other countries, and together with this, to attract essential labour, the large works also provide basic rations covering food and cloth. On top of this, in the country districts, works are under an obligation to provide water and sewage schemes, schools, hospitals, and generally supervise the town planning of the large settlements that quickly spring up. Some of these towns have a population as high as 100,000 and are a credit to industrial enterprise; the amenities and layout very often put to shame some of the housing schemes, both projected and existing, in this country. All these things cost money and where, in many cases, a 100 per cent. on wages is regarded as normal overhead charge allocation, in India 600 per cent. is much nearer the figure required.

Intermittent Labour

Besides this, the Indians at heart are an agrarian nation and it is the aim of the individual ultimately to possess his own small plot of land; as a result, the country is one mass of smallholdings, some of these holdings of less than a fraction of an acre, being the joint property of several individuals. The sowing and the harvest occupy two periods of the year, amounting in all to about 3 months, and as a result there are certain times of the year when there is an exodus from the industrial areas to the country smallholdings, which may be several hundred miles away.

All this naturally results in some dislocation of industry, coupled with the fact that at certain times of the year the climate renders undue exertion uncomfortable. Strange to say, these climatic conditions are felt in some cases more keenly by the Indian than the European. Considering carefully these preceding characteristics, to achieve successful industrialisation of India, it is necessary to render the work so remunerative that it would pay the operator to remain on the plant for the full 12 months of the year and be in a position to buy all his necessities of life without having to grow them himself or to be in a position to pay someone to operate his smallholding so that he can retire there, after several years of continuous employment.

In the same way it is necessary to adopt every mechanical aid to minimise exacting operations and make industrial work more pleasant than agricultural labouring. Coupled with this is the necessity to create within the vast population a desire to acquire personal goods and comforts, or, summing this up, a desire for improved social conditions. Following the circle right round, these can only be achieved by efficient and congenial industrial developments. These facts are realised by practically every political party in India (more so to-day than has ever been the case), and it is this awakening that will create a demand for the skilled technician to guide modern industrial progress, whoever the owner, and whatever political conception is dominant.

High wages and overhead charges mean that no passengers can be carried in industry and the highest efficiency must be maintained both as regards the basic plant methods of operation and personnel. To achieve these three objects simultaneously (as has been achieved in westernised industry), and apply and adapt them to the East, is no easy procedure, but it has already been proved that it can be successfully accomplished.

Many outstanding industrial executives have not only assisted in these Eastern projects, but many have settled down there permanently. The man required is a person with a wide range of engineering knowledge, with the ability to apply this in a practical manner, and combine with this individuality and drive, which always counts so much in a growing country. The plodding type of foreman, or the static theorist, has no place in the scheme of things, and India is not likely to welcome people of this nature from other countries when she has so many of her own.

Internal Transport

One of the major sections of the foundry industry which requires to be developed, is that of handling internal transport. When this has been solved by mechanical means, the large outputs, as are common in India, will require a degree of organising ability, which offers considerable scope for the person with this talent. On top of this is the corresponding organisation for the distribution and sales of the project, considering the vast distances which have to be covered and the many different languages and customs which have to be catered for.

Cotton spinning and weaving is stated to be the parent industry of mass production and mechanisation. This industry has become established in India with 100 per cent. success, and has been followed by ordnance and ammunition production, accentuated by the stress of the last two wars. Together with this, modern iron and steel works practice, which demands the highest degree of mechanical manipulation, has been successfully and continuously operated. The obvious next step is casting production, an industry permanently linked to the opening developments of any large agricultural nation. It is difficult to understand why large

foundry mechanisation projects have not yet been generally attempted, and where they have, in some cases, in a small way, they have not been carried to fruition and have been allowed to lapse through either apathy or lack of satisfactory technical direction.

Mechanisation Schemes

As all foundrymen know, it is not sufficient to place an order for a complete mechanised plant, moulding machines, etc., and expect it to produce castings in any form of its own accord. Mechanised foundries demand a degree of direction as wide as that of any other industry, and the slightest relaxation on the established control will release a flood of wasters beyond conception. Apart from the operation requirements, it is also understood that each class of component demands a study as to the best type of machine set up and metal specification. In ordinary jobbing moulding, half an hour in time is neither here nor there, especially when the drying factor is taken into account; this time being merely that of one individual man; but with foundry mechanisation, where many of the operators are down to one minute or less, 10 seconds represents a high percentage of the time factor and can represent a large sum of money when high overheads are taken into consideration. All these factors, which are (or should be) taken for granted in this country, have yet to be applied to Eastern industry as a whole, and the principals controlling Indian industries are rapidly realising how imperative this is.

Foundry developments in India are at last coming in for somewhat overdue consideration, and a good start has already been made by the installation of a metal spun-pipe plant which has just commenced successful operation and compares with the latest practice, as applied to this process. This, indeed, is a large step forward in foundry practice. Also sanctioned for early construction is a large mechanised foundry capable of producing 1,000 tons per week on single shift, specialising on sleeper chair production, but also being adaptable for other work should the occasion arise.

In addition to this, a large ingot mould and heavy casting foundry, light castings, and other specialised foundries are envisaged, together having a potential output in one group alone of approximately 4,000 tons per week of finished castings. Parallel to this, in another area, a general foundry, making grey iron and steel castings, is being reconstructed on the most modern lines, to have a potential capacity of 1,000 tons per week.

It, therefore, will be readily seen that there are bound to be heavy demands on the technical ability of foundry executives to inaugurate and successfully prosecute these new ventures. "Teething" troubles are bound to occur. India is no exception to what has happened in other countries when new production methods were inaugurated.

The Caste System

A question which may be raised is how is the caste system, or sectarian differences, reconciled when operating large groups of labour as is common in India? From the Author's own observation and experience, he would state that these fears should be groundless, these customs being less obstructive and hide-bound than many present-day trade union regulations and restrictions in vogue in the West, and in India, as in this country, it has been generally found that most labour difficulties are caused by outside agitation by people who have no conception of practical working conditions.

Many of the changes which are taking place, if not openly resented, are misunderstood by some of the old-timers; and the European, on arriving in India for the first time, is usually greeted with the observation that he has arrived 10 years too late, and India is not what it was. This stereotype greeting has been common since the time of Warren Hastings, and it is hoped that India is not what it was, but is progressing, bringing in its wake changing conditions for the better.

Salaries

Salaries in India are not easy to define in relation to those paid in Great Britain, but can generally be assumed to offer better conditions than those prevailing for a similar position in the U.K. The rupee is linked to sterling, but its purchasing power in India varies from district to district, being high in some areas and correspondingly low in others. In addition to the salary, the perquisites, namely, free quarters, prospects of rapid promotion, and the generally higher standard of living, warrant serious consideration.

Indian companies are quite frank when interviewing candidates and give considerable information as to the relative value of the vacancy in relation to the candidate's present employment. A young man who seeks security in his early manhood is neither an asset to his own country or any other, and should leave the quest of this elusive factor until after he reaches the age of 40, when he will find that with his broader outlook and experience, it will be much easier attained, and then, when he finally achieves this Utopia, should he find it has a slightly bitter taste, he will always have the memories of his earlier days to fall back upon. "They know not England who only England knows."

BRITISH BONDING CLAYS

War conditions made necessary an investigation of the characteristics of indigenous bonding clays which might be suitable to replace, either partly or wholly, imported bonding clays. Typical examples of the three main groups of bonding clays have been examined, and the range of properties of synthetic moulding sands prepared with them is indicated in a Paper entitled "British Bonding Clays," by W. DAVIES, Ph.D., and W. J. REES, O.B.E., D.Sc.Tech., presented to the Iron and Steel Institute. Experience has shown that, either alone or in admixture, these indigenous clays can be used successfully in many foundries.

THE NAME OF the Nuswift Engineering Company, Limited, has been changed to Nu-Swift, Limited.

THE HEAD OFFICE of Lees, Hall & Sons, Limited, is now 1, Poplar Avenue, Hove, Sussex.

IMPORTS AND EXPORTS OF IRON AND STEEL

BOARD OF TRADE RETURNS FOR FEBRUARY

Returns published by the Board of Trade contain figures of Britain's overseas trade in February. The following tables give the imports and exports of iron and steel and manufactures thereof. Monthly averages for 1938 are shown in the first column for purposes of comparison.

Total Exports of Iron and Steel

Destination.	Monthly average, 1938	Month ended February 28, 1946.	Two months ended February 28, 1946.
	Tons.	Tons.	Tons.
Eire	4,643	6,323	12,892
Channel Islands	618	740	979
Palestine	673	10,182	12,537
British West Africa	4,145	3,745	8,537
Union of South Africa	19,256	16,585	32,760
Northern Rhodesia	1,714	158	293
Southern Rhodesia	3,018	3,083	6,076
British East Africa	2,161	1,260	3,196
British India	13,222	7,493	14,438
Burma	1,543	1,618	2,910
British Malaya	5,549	3,769	6,220
Ceylon	2,169	860	1,363
Hong Kong	1,966	1,037	2,572
Australia	14,241	1,081	2,182
New Zealand	10,990	4,158	7,244
Canada	7,117	445	1,006
British West India Islands	3,687	1,336	3,132
Anglo-Egyptian Sudan	691	578	1,656
Other British Countries	1,826	2,699	3,910
Soviet Union	362	—	—
Finland	1,467	5,926	5,944
Norway	1,689	8,277	16,298
Iceland	55	949	1,540
Denmark	7,271	18,476	25,791
Poland	207	19	451
Netherlands	4,297	19,635	31,800
Dutch East Indies	2,276	—	—
Dutch West India Islands	205	2,424	3,557
Belgium	1,694	2,372	8,613
France	1,116	8,253	14,717
Portugal	643	3,297	8,217
Portuguese East Africa	1,185	182	298
Spain	647	1,445	1,833
Italy	428	9	11
Greece	146	480	2,554
Turkey	1,146	304	2,152
Egypt	2,867	7,498	20,550
Iraq	2,145	4,180	7,990
Iran	9,197	5,542	16,692
China	1,844	54	54
U.S.A.	182	86	118
Venezuela	390	1,480	3,656
Ecuador	133	128	554
Chile	524	517	771
Brazil	1,416	646	10,335
Uruguay	632	504	1,454
Argentine	6,613	8,168	11,939
Other Foreign Countries	9,642	18,017	32,193
Total	159,656	186,018	354,585

FROM "THE SHAKEOUT"—a bulletin published by the Twin City Chapter of the American Foundrymen's Association, we learn that a special train is being run from St. Paul to take the local delegates to the forthcoming Cleveland Congress. This pamphlet credits Mr. Alex Douglas, works manager of Peacock Bros., Limited, of Canada, with the slogan, "If you would not buy the casting . . . don't sell it!"

Exports of Iron and Steel by Products

Product	Monthly average, 1938	Month ended February 28, 1946	Two months ended February 28, 1946
	Tons	Tons	Tons
Pig-iron	7,828	60	62
Ferro-alloys, etc.—			
Ferro-tungsten	43	57	115
Spiegeleisen and ferro-manganese	433	5,265	14,279
All other descriptions*	87	118	190
Ingots, blooms, billets and slabs	812	129	237
Iron bars and rods	266	2,110	2,740
Sheet and tinplate bars	1,032	118	221
Wire rods and bright steel bars	814	4,218	6,600
Other steel bars and rods	8,500	27,008	46,945
Special steel	411	1,259	2,500
Angles, shapes and sections	5,617	12,756	24,057
Castings and forgings	135	211	332
Girders, beams, joists and pillars	2,789	6,128	12,039
Hoop and strip	3,115	8,782	13,179
Plates, ¼ in. thick and over	10,913	30,239	48,105
Black plates	1,211	506	1,543
Black sheets	5,292	2,071	4,069
Galvanised sheets	12,244	750	1,523
Tinplates	26,608	6,751	15,967
Tinned sheets	117	152	216
Terneplates	360	130	130
Decorated tinplates	364	28	140
Cast-iron pipes, up to 6 in. dia.	4,077	3,521	6,510
Do., over 6 in. dia.	3,580	1,013	4,932
Wrought-iron tubes	18,332	24,516	39,703
Steel rails	8,833	7,762	29,933
Sleepers and fishplates	2,115	8,466	23,303
Other railway material	2,231	1,491	2,797
Wire	4,599	6,286	10,341
Wire manufactures	2,458	2,070	3,202
Nails, tacks, etc.	317	592	1,381
Rivets and washers	711	582	1,233
Wood screws	209	392	871
Bolts, nuts, and metal screws	1,464	2,074	3,386
Stoves, grates, etc.	762	454	901
Sanitary cisterns	234	64	106
Fencing material	427	53	244
Anchors, etc.	528	452	677
Chains	524	765	1,338
Springs	328	657	958
Hollow-ware	892	5,337	9,748
All other manufactures	18,036	10,625	16,832
Total	159,656	186,018	354,585

* The figures for 1946 are not completely comparable with those for earlier years.

Total Imports of Iron and Steel.

From	Monthly average, 1938.	February, 1946.	Two months, 1946.
	Tons.	Tons.	Tons.
British India	12,968	2,517	5,244
Australia	3	6,019	13,803
Canada	9,781	17,088	24,887
Other British Countries	466	20	89
Sweden	7,483	183	277
Norway	2,814	1,416	1,954
Belgium	22,806	2,012	2,016
Luxemburg	4,883	—	—
France	21,446	60	60
U.S.A.	16,724	15,372	21,883
Other Foreign Countries	12,644	3	10
Total	112,023	44,690	70,223
Iron ore and concentrates—			
Manganiferous	5,190	—	6,000
Other sorts	425,156	463,688	873,081
Iron and steel, scrap and waste, fit only for the recovery of metal	52,684	28,621	55,566

CUPOLA PRACTICE

NEED FOR COKE GRADED TO FURNACE DIAMETER STRESSED

Earlier in the Session, the Lincoln section of the Institute of British Foundrymen heard and discussed "Consistency of the Cupola," by Mr. C. A. Payne, for which a diploma has been awarded. The Chairman, Mr. J. C. Hallamore, opened the discussion with a question as to slag composition and appearance under varying melting conditions. He also suggested that coke might be graded in sizes to suit different cupolas.

MR. PAYNE said that the time to burn the coke depended to some extent on the design of the cupola. It was not entirely a function of varying air volume supplied, as for instance, too much air could actually extinguish the coke. Coke size was a controlling feature, but although coke manufacturers admitted that coke grading was possible, they claimed that the foundry industry had not insisted on this matter and in any case the foundries had not yet established the gradings to suit different diameters of furnace. Slag was mainly a means of removing gangue or earthy matter. It was capable of indicating various conditions in cupola melting. The formation of slag wool showed melting practice to be fairly correct and to obtain the most information from colour and appearance the sample of slag should be quickly cooled. A black glossy sample, especially in high steel charges, would indicate high melting loss of iron and manganese; if the sample showed no appreciable gloss then the use of too much limestone was indicated. Correct melting gave a pale lemon, glassy sample. In the basic lined cupola the slag became a definite control factor.

Mechanical Charging

MR. DUNLEAVY, commenting on the Author's statements as to disposition of charge materials, agreed that selective charging giving even distribution in the stack was no doubt desirable. However, mechanically charged burdens, with uneven disposition, also seemed to give good results and since mechanical charging was likely to supersede hand-charging he would appreciate Mr. Payne's views on this matter.

THE AUTHOR replied that his own experience of mechanical charging was distinctly unfavourable. However, its disadvantages were realised and all pig and cast-iron scrap charges could even out variations. In his own case, tapping out less than one charge, he had found 30 to 40 per cent. steel gave wide variations in final composition, and mixes relying on ferro-alloys mechanically charged were quite hopeless.

MR. HORNBY stated that in the Author's illustrations had been a diagram showing a cupola in which the well was obviously wider than the melting zone. Was this correct? Also could Mr. Payne express a preference for intermittent or continuous slagging out?

Mr. Payne pointed out that the sketches were not strictly to scale, but it was quite common practice to put a step above the tuyeres to thicken up the melting zone. In his own practice slagging out was intermittent and timed. Any losses through continuous slagging were constant losses whereas intermittent slagging varied these losses, but in the main the Author felt that intermittent slagging was preferable for efficient melting.

Coke Storage

MR. HORTON questioned the Author as to the advantages to be gained from storing cokes under adequate shelter. Also what was the Author's opinion of the hot blast cupola? In view of the prevailing habit of running cupolas using blast pressure as an indication of the air supply, would variations in coke sizes greatly affect the blast pressure? Finally, he understood that the sand bottom of the cupola should slope gently up to the tap-hole for 5 or 6 inches, not down as stated by the Author, this as a specific against an "iron-hole."

Mr. Payne said that the efficiency of coke storage depended on drying conditions and the type of shelter, but in any case coke storage under shelter was to be preferred to open stack storage in the scrap yard. Hot blast would favour the formation of carbon dioxide, and reduce the chilling tendencies at the tuyeres, but he felt that its introduction was always mainly a corollary to the possession or availability of a cheap or waste source of heat. The blast pressure could conceivably show variations in bulk sizes of cokes, but it was doubtful if blast pressures could be regarded as a reliable indication of air volumes. The slope of the sand bottom varied with different operators but the Author felt that, however successful in avoiding "iron-holes" the back slope from the tap-hole might be, the inability to drain the furnace was a drawback, and the unavoidable pool of metal could be dangerous on dropping the bottom.

Coke Ratios and Metal Temperatures

DR. WALTER raised the question of the extent of heat loss due to incomplete combustion as the burning rate of the coke was increased. He noticed that high coke ratios gave lower metal temperatures.

The Author said that as long as the increased burning rate kept the same ratio of air to coke he did not see that heat losses should become excessive and the high coke-ratio mentioned by Dr. Walter was mainly employed to give carbon pick-up and did give lower temperatures.

MR. KILLINGWORTH asked whether it was essential to run uniform sizes of steel scrap in high steel charges. Also had the Author measured the actual velocity of the air through the tuyeres? Had variation in coke size caused the Author to alter bed and charge cokes?

In reply, Mr. Payne said that he had not personally determined tuyere velocities, but the Meehanite interests had done so and found (1) a lack of uniformity through each tuyere and over the cross-sections of individual tuyeres, and (2) a variation of velocity in the wind-belt itself according to the testing position in relation to the blast main. He had found that Durham small cokes tended to burn away more rapidly than, say, Welsh cokes, and he had had to allow for this either by increase in bed coke or by using double coke every five or six charges. He pre-

(*Continued on page* 392.)

APPEAL FOR INCREASED • PRODUCTION

T.U.C. COUNCIL'S RESPONSE TO GOVERNMENT

In response to the appeal of the Government for greatly increased production, the General Council of the Trades Union Congress has sent a statement to all affiliated unions which contains the following suggestions for adding to the man-power of industry and the rate of output. The suggestions are:—Class B demobilisation to be raised above the present 15 per cent. of Class A releases; appeal to women workers to remain in, or return to, industry; encouragement of skilled men over 65 to remain in employment; employment of prisoners of war; establishment of national industrial advisory committees, representing the employers and the unions, to deal with production questions in particular industries, with recruitment, and with welfare; works production committees, and examination of P.A.Y.E. taxation on overtime earnings.

Referring to the urgent need for increasing exports to a volume nearer 75 per cent. than 50 per cent. in excess of our exports before the war, the General Council says that this problem "neither can nor should be solved only by attempts to expand our export trade and least of all by the traditional methods of cut-throat competition. It demands the public regulation and planning of our foreign trade as a whole."

The Council refers to the suggestion of "a national wages policy," and says much of the argument for such a policy is academic and unconvincing. No responsible authority has attempted to set out in any detail the meaning of the phrase nor the methods and machinery to be employed. During the war the dangers of inflation and of the maldistribution of labour were greater than now, and it was not then found necessary or desirable to modify the normal practices of wage settlement. The T.U.C. has decided for the time being not to disturb the wartime arrangement prohibiting strikes and lock-outs and establishing a national arbitration tribunal, but it will not agree to legal restraints upon the rights of unions to formulate wage policies or to pursue activities in support of those policies.

FINDING SITES FOR ROLLING MILLS

Denying that action was being deliberately held up pending a Government decision on nationalisation, Mr. E. H. Lever, chairman of Richard Thomas & Baldwins, Limited, has outlined the difficulties of finding suitable sites for the two modern cold-rolling mills to be erected in West Wales. He pointed out that if the ownership of the industry remained with the many and widespread shareholders of its constituent companies, the question of site selection would depend on a careful appraisal of many factors. These included the existence in West Wales of extensive underground working, and apart from this the six main considerations to be taken into account were labour supply and housing, availability and cost of electricity, water, sewerage, accessibility of site, and availability of transport.

OBITUARY

MR. HERBERT THOMPSON GARVIE, chairman and managing director of the British Steel Piling Company, Limited, died at Alexandria, Egypt, recently.

MR. A. EDGAR KNOWLES, chairman and managing director of the International Electrolytic Plant Company, Limited, Sandycroft, near Chester, died at Colwyn Bay, on March 31, after a long illness. He was 75.

MR. S. WELLS UTLEY, president of the Detroit Steel Castings Company, has died in America, at the age of 66. He was president of the American Foundrymen's Association in 1927, and participated in the 1929 London International Congress.

MR. HAROLD EDWARD WRIGHT, chief metallurgist to Dorman, Long & Company, Limited, who died at Middlesbrough on March 28, in his 78th year, was one of the pioneers of the steel industry on Tees-side, and a scientist who had gained some of the highest honours in his profession. For 62 years he had been in the service of the Dorman, Long group. It was largely due to his research work on waste gases, when he was in charge of the coke-oven plant of the old Newport Ironworks, that the Middlesbrough Corporation became the first local authority in Great Britain to adapt the use of coke-oven gas for domestic purposes. Last year Mr. Wright was awarded the Bessemer gold medal by the Iron and Steel Institute in recognition of his efforts to improve the technique of iron and steel production, and the completion of 60 years' service with Dorman, Long & Company was recognised by the institution of the Harold Wright triennial lectures. For 44 years Mr. Wright was a member of the Iron and Steel Institute. He was a past-president of the Cleveland Institution of Engineers and the Cleveland Scientific and Technical Institution, and a member of many technical committees concerned with the iron and steel industry.

INCREASED IMPORTS INTO EIRE

Trade returns for 1945 show that during the year Eire imported iron and steel and manufactures of a total value of £1,875,157, as compared with £930,939 for the previous 12 months. Among the leading items were:—Pig-iron, £23,103, against £20,151; steel bars and rods, £196,898, against £42,137; squares and flats, £113,433, against £26,868; iron and steel manufactures, constructional, fabricated, £19,965, against £2,012; unfabricated £99,298, against £8,321; plates and sheets, uncoated, £58,243; against £42,356, coated, £147,350, against £105,369; railway material, £30,236, against £14,650; cast iron, £42,778, against £13,616; wrought iron or steel pipes, £82,934, against £46,412; cast-iron goods, £50,169, against £30,246; tanks, cisterns, etc., £10,958, against £1,738. Imports of non-ferrous ores, metals and manufactures reached £587,933, against £214,370.

TWO LINERS OF 12,500 tons gross have been ordered from John Brown & Company, Limited, Clydebank, by Portuguese owners.

IN PARLIAMENT

Castings for Houses

Drastic shortages of labour in many of the building materials industries were admitted by the Minister of Works in a debate last week in which Opposition spokesmen criticised the Government's incursion into these industries.

COMMANDER GALBRAITH, leading the Opposition, demanded explanations of the shortages of materials, including gutterings and cast-iron pipes for permanent housing, which, he said, were practically unobtainable anywhere. It was alleged that stocks of these were held by the Ministry of Works for temporary houses. The Minister of Works, he recalled, had declared in the House that he was going into business "in a big way" both in the manufacture and distribution of building materials and components. He did not think the Minister's entry into business had succeeded in getting rid of shortages of material, nor had it removed bottlenecks in distribution. But the Minister had certainly succeeded in producing a ponderous and unwieldy machine, and also in upsetting, to a large extent, the confidence of those industries which, before the war, produced and distributed everything that was required for an annual output of some half million houses.

MR. GEORGE TOMLINSON, the Minister of Works, replied in a gloomy speech stressing difficulties and shortages of labour. Referring to temporary houses, he said there had been shortages of baths and other things, but it was untrue to say, as had been said lately, that 10,000 temporary houses had been held up for six months for lack of these things. The policy now being followed, he said, was to build up home capacity to an extent sufficient to meet all home requirements and to leave a margin for "substantial" exports. In general, pre-war capacity remained available, but, owing to the marked concentration of building materials industries during the war, much had to be done to rehabilitate plant and buildings and bring back skilled labour and management. Speaking of the difficulty in regard to iron castings, Mr. Tomlinson said that substitute materials had been introduced in the form of pressed steel and aluminium, and these materials would now be used in the manufacture of baths, lavatory basins, sinks, gas and electric cookers and rain water guttering. Investigations were proceeding with a view to introducing a substitute for cast-iron water pipes and soil pipes. At the same time, no effort was being spared to increase the flow of labour into foundries in order to step up the present production of iron castings to a maximum.

Lead Shortage

MR. MARPLES asked the Minister of Supply why the stocks of refined lead had dropped from 126,500 tons in June, 1945, to 64,800 tons in December, 1945; whether he was satisfied with the reduced stocks now held in this country; and what action he was taking to improve the situation.

MR. WILMOT, in reply, said that production had not expanded to match the large increase in world demand since the end of the war. Present stocks of lead were, therefore, low, but they were doing all they could to secure a fair share of available supplies and, by rationing it and using substitute materials wherever possible, they expected to meet all essential needs.

MR. MARPLES asked if the Minister was aware that steady inroads had been made on these stocks since the present Government took office, and, unless they did something about it, the present housing programme —which was pathetic enough, in all conscience—would suffer terribly.

MR. DAVID ECCLES: Is the Minister aware that this bad stock situation is due to a wrong decision by his Ministry to hold themselves aloof from the market, and that this situation would not have arisen if we had not had bulk buying, but had the London Metal Exchange working freely?

MR. WILMOT: I cannot accept that interpretation.

MR. EDEN: May I ask the Minister whether, even if he cannot accept the interpretation—which is a matter for argument, because the figures themselves are sufficiently alarming—he is really confident this fall will not in any way affect the work of building?

MR. WILMOT said they would do their best to avoid it. There was a severe world shortage of lead due to the sudden expansion in demand with the end of the war. It was not one of the metals largely used in modern war. There was an abnormally expanding world demand and a fall in production.

Future of the Iron and Steel Industry

MR. BOOTHBY asked the Minister of Supply whether he was now in a position to make a statement about the future of the iron and steel industry.

MR. WARBEY asked if the Minister had completed his examination of the reorganisation report submitted to him by the iron and steel industry; and what steps he proposed to take to ensure that this industry was conducted in accordance with the national interest.

MR. JOHN WILMOT: I am not in a position to make a statement about the future of the iron and steel industry.

MR. BOOTHBY: Is it not a fact that the report on this industry has been in the hands of the Government for some months, and also that the continuing uncertainty about this basic industry is damaging to our economic recovery? When will the Government be in a position to state what they propose to do?

MR. WILMOT: I cannot say.

MR. BOOTHBY said that, in view of the unsatisfactory nature of the reply, he proposed to raise the matter on the Adjournment.

ENGINEERING WAGES

At a meeting between representatives of the National Engineering Joint Trades Movement and the Engineering and Allied Employers' National Federation in London last week, full agreement was reached on engineering wages and conditions. There is to be an increase in the existing national war bonus to all adult male workers of 6s. per week, with proportionate adjustments in the bonus of apprentices, boys and youths; and payment for six Bank or other holidays and a guaranteed week of 34 hrs. subject to certain qualifications.

PERSONAL

THE HON. R. M. PRESTON has retired from the board of the Rio Tinto Company, Limited.

MR. S. F. STEWARD has been released from his post as Director-General of Machine Tools to return to industry.

MR. T. S. SIMPSON, general manager of William Gray & Company, Limited, shipbuilders, of West Hartlepool, is to retire, and will be succeeded by MR. J. LENAGHAN.

MR. R. D. BURN has been released from his duties as Director of Non-Ferrous Metals, and the Minister of Supply has appointed MR. A. G. CHARLES to succeed him.

MR. JAMES DURRANS, managing director of James Durrans & Sons, Limited, manufacturers of foundry requisites, of Phœnix Works, Penistone, Sheffield, has been elected a member of the local council.

MR. C. F. BATSTONE, Midland branch manager of the British Aluminium Company, Limited, has been appointed principal assistant sales manager. He is succeeded by MR. C. G. POUNTNEY as Midland branch manager.

MR. K. G. LAMPSON, Deputy Iron and Steel Controller, has been released by the Minister of Supply and of Aircraft Production. He will return to industry, but will continue to act in an advisory capacity to the Controller.

BREVET-COL. HAROLD BANTOCK SANKEY, managing director of Joseph Sankey & Sons, Limited, and a director of Guest, Keen & Nettlefolds, Limited, and other companies, has been appointed Sheriff for the county of Staffordshire.

MR. J. J. P. MACKENZIE has been appointed by Hadfields, Limited, as their sales representative in the Yorkshire area. MR. BEAUMONT SYKES, who will shortly be leaving the company, has represented them in part of this area for the past six years.

SIR A. MURRAY STEPHEN, a director of Alexander Stephen & Sons, Limited, shipbuilders, etc., of Glasgow, has been appointed a member of the newly-formed Scottish Committee of the Industrial and Commercial Finance Corporation, Limited.

MR. J. L. M. BAKES has been appointed sales manager of Catton & Company, Limited, Yorkshire Steel Foundry, Hunslet, Leeds. He spent some years in the Far East and of recent years has been connected with the General Electric Company, Limited.

MR. DAVID JENKINS, who during the war was shipyard manager at the Cleveland Dockyard, Middlesbrough, for the Tees-side Bridge & Engineering Company, Limited, has been appointed assistant general manager for Wm. Gray & Company, Limited, shipbuilders and repairers, of West Hartlepool.

MR. J. S. HOLLINGS, a director of Guest, Keen, Baldwins Iron & Steel Company, Limited, of Port Talbot, Glamorgan, has been awarded the Bessemer gold medal of 1946 by the Council of the Iron and Steel Institute in recognition of his distinguished services in encouraging technical improvement in the manufacture of iron and steel.

MR. LOUGHNAN ST. LAWRENCE PENDRED, Editor of the "Engineer," retired on April 1, after serving that journal for 50 years and occupying the editorial chair for 40 years. He became editor in 1905, in succession to his father, Vaughan Pendred, who had himself been editor for 40 years. Mr. Loughnan Pendred is to be succeeded in his turn by his son, Benjamin, who joined the staff of the "Engineer" in 1931. Mr. Loughnan Pendred was president of the Institution of Mechanical Engineers, of which he is now an honorary member, in 1930-31. He is a founder member of the Newcomen Society, of which he has twice been president. In 1934 he was created C.B.E. in recognition of his services to the engineering profession.

MR. B. P. CHELTENHAM has been appointed to the contact staff of the British Export Trade Research Organisation. A Sheffield man, he has spent all his life in the engineering world. He served his apprenticeship with Metropolitan Vickers and took his degree in engineering at Manchester University. Subsequently he joined Vickers, Limited. At the beginning of the war he became Senior Inspecting Officer for the Chief Inspector of Armaments and as such was given a special assignment to investigate engineering and steel-making plants in France and Belgium and report back to the British Government. He served in this department until the conclusion of hostilities in Europe, when he became Controller of the Armament and Machine Tool Division (Economic Branch—Control Division) in Germany.

MR. A. J. MURPHY, M.Sc., F.I.M., has been elected to the board of J. Stone & Company, Limited, engineers and founders, of Deptford, London, S.E.14. He joined the company as chief metallurgist in 1931 from the National Physical Laboratory. Mr. Murphy has taken an active part in various technical organisations concerned with non-ferrous metals, serving as chairman of the Research Board of the British Non-Ferrous Metals Research Association and having recently completed a period of service as vice-president of the Institute of Metals. He is president of the London branch of the Institute of British Foundrymen, a member of the Council of the Institution of Metallurgists, and a representative of the Non-Ferrous Industry Committee on the Engineering Divisional Council of the British Standards Institution.

CHROME ORE PRICES

The following prices, per ton, for chrome ore came into operation on April 1:—

Refractory Grades.—Rhodesian Imperial grade, £10 15s.; Transvaal, 1st grade, £8 17s. 6d.

Metallurgical Grades.—Rhodesian lumpy metallurgical, £10 17s. 6d.; Rhodesian washed concentrates, £10 17s. 6d.; Baluchistan, £10 15s.

Chemical Grades. — Rhodesian Dyke chemical, £10 17s. 6d.; Transvaal chemical concentrates, £11; Baluchistan, £10 15s.

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Thickness	3¾ inches

(at notch 2½ inches).

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NEWS IN BRIEF

THE LONDON OFFICE of Hick, Hargreaves & Company, Limited, is now at 1, Lancaster Place, W.C.2.

THE BRITISH ALUMINIUM COMPANY, LIMITED, have acquired the Latchford Locks (Warrington) Refinery and Powder Works.

ERNEST HINCHLIFFE, LIMITED, fluorspar producers, etc., announce that their registered office is now at 60, Dunkeld Road, Sheffield, 11.

W. J. HOOKER, LIMITED, announce that they have now transferred their offices to 4, Midland Crescent, Finchley Road, London, N.W.3.

F. PERKINS, LIMITED, are erecting a large new factory for the production of Diesel engines at Newark, on the outskirts of Peterborough.

MOAP ENGINEERS, LIMITED, is being wound up voluntarily. Mr. C. S. Forsyth, 115A, Chancery Lane, London, W.C.2, is the liquidator.

THE OFFICIAL cost-of-living index figure on March 1 was 103 points above the level of July, 1914, showing no change as compared with February 1.

IN ORDER TO DEMONSTRATE the importance of the British shipbuilding, marine engineering and associated industries, the Worshipful Company of Shipwrights will hold an exhibition in the two halls of the Royal Horticultural Society, Westminster, London, S.W., early in 1947.

ALMIN, LIMITED, of Farnham Royal, Bucks, announce that Mr. E. A. G. Liddiard has resigned his position of research manager of the British Non-Ferrous Metals Research Association to take up his appointment as director of the Fulmer Research Institute, founded by Col. W. C. Devereux.

ASSOCIATED ELECTRICAL INDUSTRIES, LIMITED, propose to increase their capital to £8,696,050 by the creation of a further 838,050 ordinary shares of £1, which will be converted into stock when issued and fully paid. An extraordinary meeting will be held on April 10 to consider the proposals.

MR. G. WEST BYNG, chairman of the Tees Conservancy Commission, has announced that it is hoped to commence in July next a scheme for deepening by 5 ft. the navigable channel of the River Tees from the estuary to the Newport bridge. It is expected that the work will take five years to complete.

AT A MEETING of the shop stewards within the works of Ley's Malleable Castings Company, Limited, of Derby, a resolution was passed thanking the directors for their intense interest in the workers' welfare. There were so many aspects that it took a full column of the local newspaper to print all the details.

AN EFFORT TO COMBAT the coal shortage by a new method of heating was mentioned by Mr. James B. Macouat, chairman, at the annual meeting of the Rivet, Bolt & Nut Company, Limited. An experimental plant for electrical induction heating was at present in process of erection and promised good results.

FISHER & LUDLOW, LIMITED, manufacturers of metal pressings, etc., of Rea Street, Birmingham, 5, are issuing 500,000 4½ per cent. cumulative redeemable preference £1 shares. The shares are offered to holders of the existing 7 per cent. (tax-free) cumulative preference shares and ordinary stock at a price of 21s. 3d. a share.

MR. J. W. WHEELER, formerly manager of one of the Rolls-Royce die-casting plants, and later adviser to the Reynolds Metals Company (Casting Division), has established himself in a consulting practice at Worthington Building, Springfield, Ohio, where he has engaged a staff of estimators, designers and engineers versed in die-casting practice.

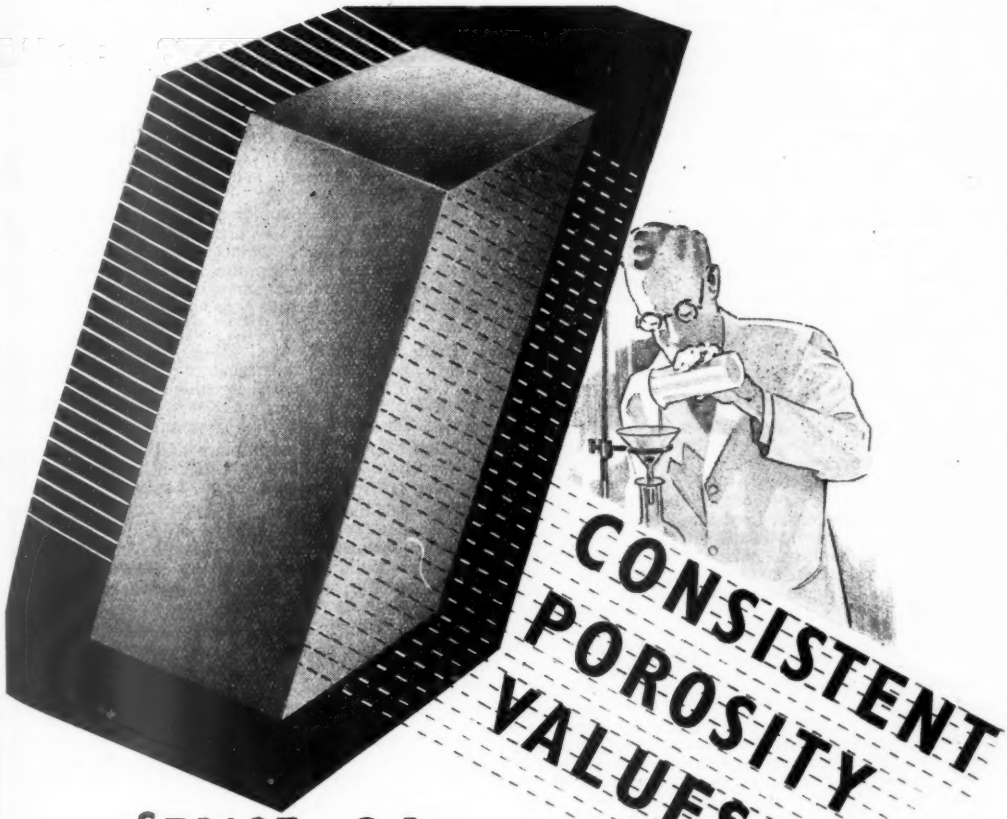
IN A REVIEW of Dundee's industrial position, Mr. W. H. Valentine, chairman of the local Chamber of Commerce, mentioned that engineering and shipbuilding concerns had well-filled order-books. Engineering was suffering from a bottleneck on the foundry side, owing to the lack of skilled moulders; there were no young persons coming forward in that branch, a fact causing grave concern.

FOUNDRIES MUST BE MADE cleaner, brighter, and pleasanter to work in, or the shortage of young labour would become increasingly acute, Miss F. A. F. Livingstone, chairman of the Institute of Labour Management, told the Foundry Society at the Department of Applied Science, Sheffield. Present conditions in the industry were worse than she had seen in America, France, Germany, and Russia.

HADFIELDS, LIMITED, have purchased the sole control of the business of the manufacturers of paper-making machinery and ferrous and non-ferrous and centrifugal castings carried on by Mr. W. H. Millspaugh under the name of Millspaugh, Limited, within the East Hecla works of Hadfields, Limited. Millspaugh, Limited, will retain its identity and develop its facilities to provide greater production capacity.

THE "SILVER STAR" STATUETTE, the trophy of the new National Film Award, to be given annually for brilliance in acting and production for British films, is being cast in silver by Mr. Charles Gaskin, at the Art Bronze Foundry, Fulham Road, Fulham, London, S.W.6. Three replicas of the trophy are to be cast in silver for the "Daily Mail," which will present annually one each for the best British film, the best performance by an actor and by an actress in British films. Mr. Rebel Stanton is the sculptor. Each statuette, 22 in. high, will be hall-marked and weigh 140 ozs.

SHERIFF MACGREGOR, K.C., conducted a public inquiry at Falkirk Sheriff Court into the death of Mr. Hugh Vallance, of Carron Terrace, Carron, Falkirk, who was employed as an ironmoulder by the Carron Company. It was brought out in evidence that Mr. Vallance, on November 30 last, was working in the heavy moulding shop, where he was assisting in the work of freeing an 8-cwt. sliding door which had jammed. The door suddenly fell outwards and downwards, and Mr. Vallance was injured. He died later as a result of a fractured spine. Sheriff Macgregor returned a formal verdict of accidental death.



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Raw Material Markets

IRON AND STEEL

With the beginning of Period II, more active conditions have developed in the iron trade. Foundrymen are keen to purchase both for immediate and forward requirements, and fairly substantial orders have been placed. Most of the light foundries are taking up their maximum allocations of high-phosphorus iron and there has been some improvement of late in the volume of work placed with the engineering and jobbing foundries. Thus the output of the blast furnaces is passing promptly into consumption, but refined iron is slow of sale and makers welcome the conditional release of small tonnages of this grade for disposal reasons. Unfortunately, there is as yet no improvement in the scrap position. There is a shortage of light and medium scrap for the light foundries, and consumers are having difficulty in getting their licensed tonnages.

The foundry coke position should improve with the warmer weather, and it should soon be possible to lay down stocks. Foundries have no difficulty in securing limestone, ganister and ferro-alloys.

Re-rollers continue to press for maximum deliveries of steel semis and readily accept any defective material suitable to be put through the mills. But here and there home supplies are inadequate, and although the authorities are anxious to reduce imports to the lowest possible levels, a fair amount of material from the Dominions of Canada and Australia is still being distributed.

NON-FERROUS METALS

The Minister of Supply has made the Control of Non-ferrous Metals (No. 22) (Copper, Lead and Zinc) Order, 1946, which came into force on Monday. Under the Order the maximum prices for copper, lead, zinc and zinc products are increased as follow:—Copper by £10 a ton; lead by £6 a ton; zinc by £8 a ton; zinc sheets by £8 a ton; zinc oxide by £7 a ton. Holders of valid licences to purchase copper, lead, or zinc metal (as sold by the Directorate of Non-Ferrous Metals) granted on or before April 6 may, on application to the Directorate at the Grand Hotel, Rugby, cover themselves by purchases, where they have not already done so, against such licences up to and including April 22 at the maximum prices ruling on April 6. The new Order further provides that licences will henceforward be required for certain additional descriptions of lead.

The Minister of Supply announces that, in view of the change in the statutory maximum prices of copper, lead and zinc, prices of non-ferrous scrap metals are being amended.

The announcement of the price increases was not accompanied by any official explanation, but the move seems to be a rather long-delayed effort to bring prices paid by the consumer into line with world prices. Thus, consumers will no longer be subsidised at the expense of the taxpayer. Details of the Government policy of bulk buying have been very obscure all along, and it is possible that the higher prices have been introduced because Government stocks purchased at lower levels have come to an end, precipitated by the low prices to consumers.

CONTRACTS OPEN

Any date given is the latest on which tenders will be accepted. The address is that from which forms of tender may be obtained.

Bude, April 24—Supplying, laying, and jointing of approx. 2,220 yds. of 6-in. dia. spun-iron pipes, together with connections and the installation of waste water meters, for the Bude-Stratton Urban District Council. Mr. T. H. Chambers, surveyor and water engineer, Surveyor's Office, 7, Belle Vue Avenue, Bude, Cornwall. (Fee £3 3s., returnable.)

High Wycombe, April 23—Manhole covers and frames, gully grates and frames, etc., for the 12 months ending March 31, 1947, for the Corporation. Mr. J. A. Parkinson, borough engineer, Municipal Offices, Queen Victoria Road, High Wycombe.

Leigh, April 15—Sewer pipes and castings, for the Corporation. Mr. Thomas A. Clare, borough engineer and surveyor, Town Hall, Leigh, Lancs.

Newcastle-under-Lyme, April 17—Cold-blast slag (5), castings (14), for the year ending March 31, 1947, for the Borough Council. The Borough Surveyor, Lancaster Buildings, High Street, Newcastle, Staffs. (Applicants for particulars must specifically state the number given in parentheses.)

Wigton, April 25—Providing, laying and jointing of about 6,050 yds. of 4-in. spun-iron pipes, for the Rural District Council. Mr. D. Easton, clerk, Council Offices, Wigton, Cumberland.

THE AGENCY SALES REPRESENTATION of Thos. Firth & John Brown, Limited, which has been in the hands of Power Units, Limited, Swansea, for a number of years, was concluded on March 31. Mr. E. S. Gregory and Mr. W. J. Davies have been appointed sales representatives for the company in South Wales.

THE DIRECTORS of the Brush Electrical Engineering Company, Limited, have called an extraordinary general meeting for April 16 for the purpose of giving them power to borrow up to £1,750,000 or the amount of the paid-up capital (whichever should be the greater) in lieu of the present maximum of £750,000.

DISCUSSING THE POSITION of South Wales in view of prospective reduction in Germany's steel potential, at a meeting of the West Wales Industrial Discussion Group, Mr. J. N. Kilby, of the Briton Ferry Steel Company, Limited, asked if they in that area were fully alive to the possibilities that if the steel production of Germany were to be reduced by the figure suggested, it would mean that a trade volume of 10 to 12 million tons of steel would become available. It was up to them to be prepared should any portion of German trade become available to them.